Columbia River Temperature Modeling

- Supporting Columbia/Snake Mainstem Temperature TMDL
- EPA is technical lead for this TMDL

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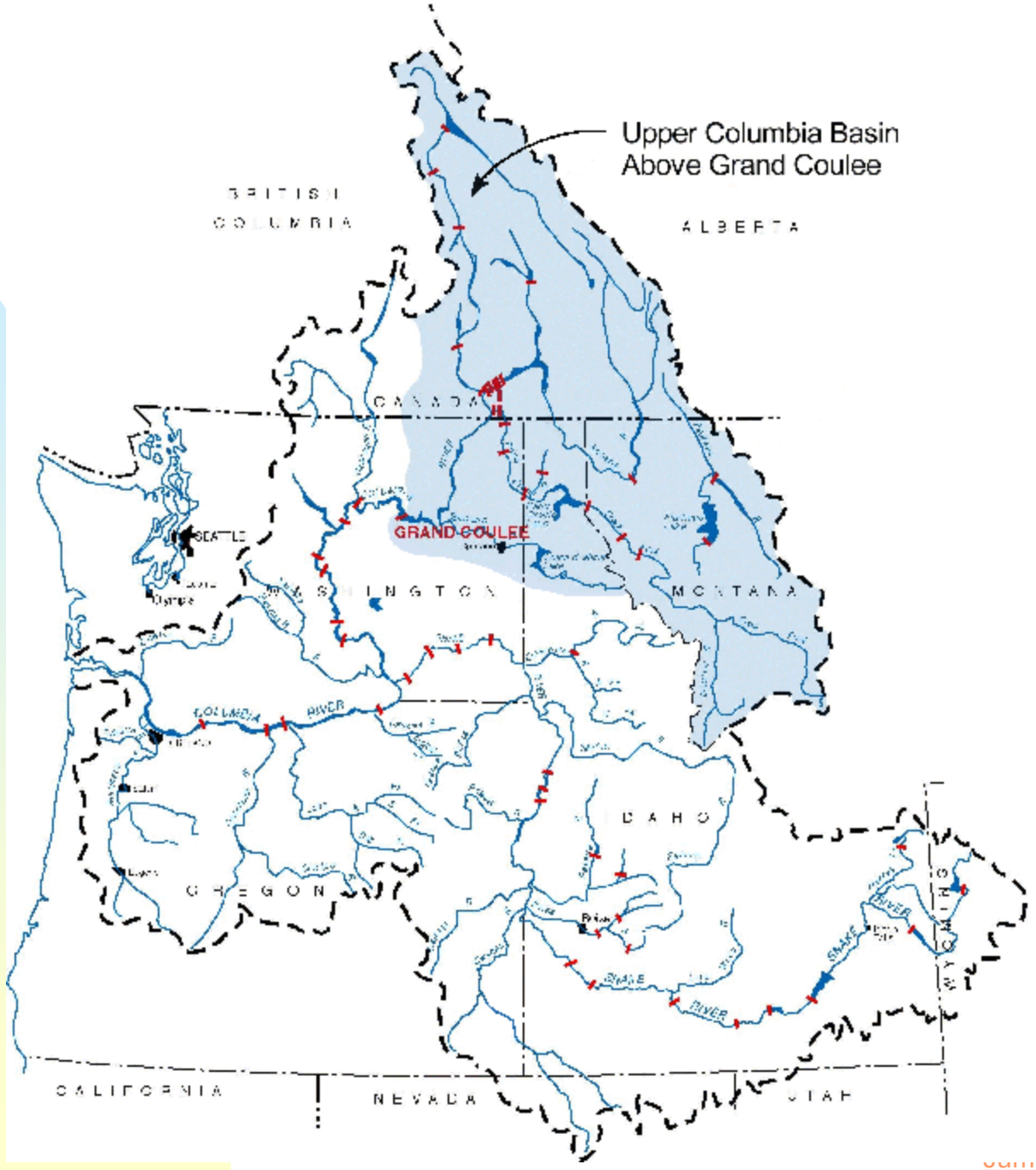

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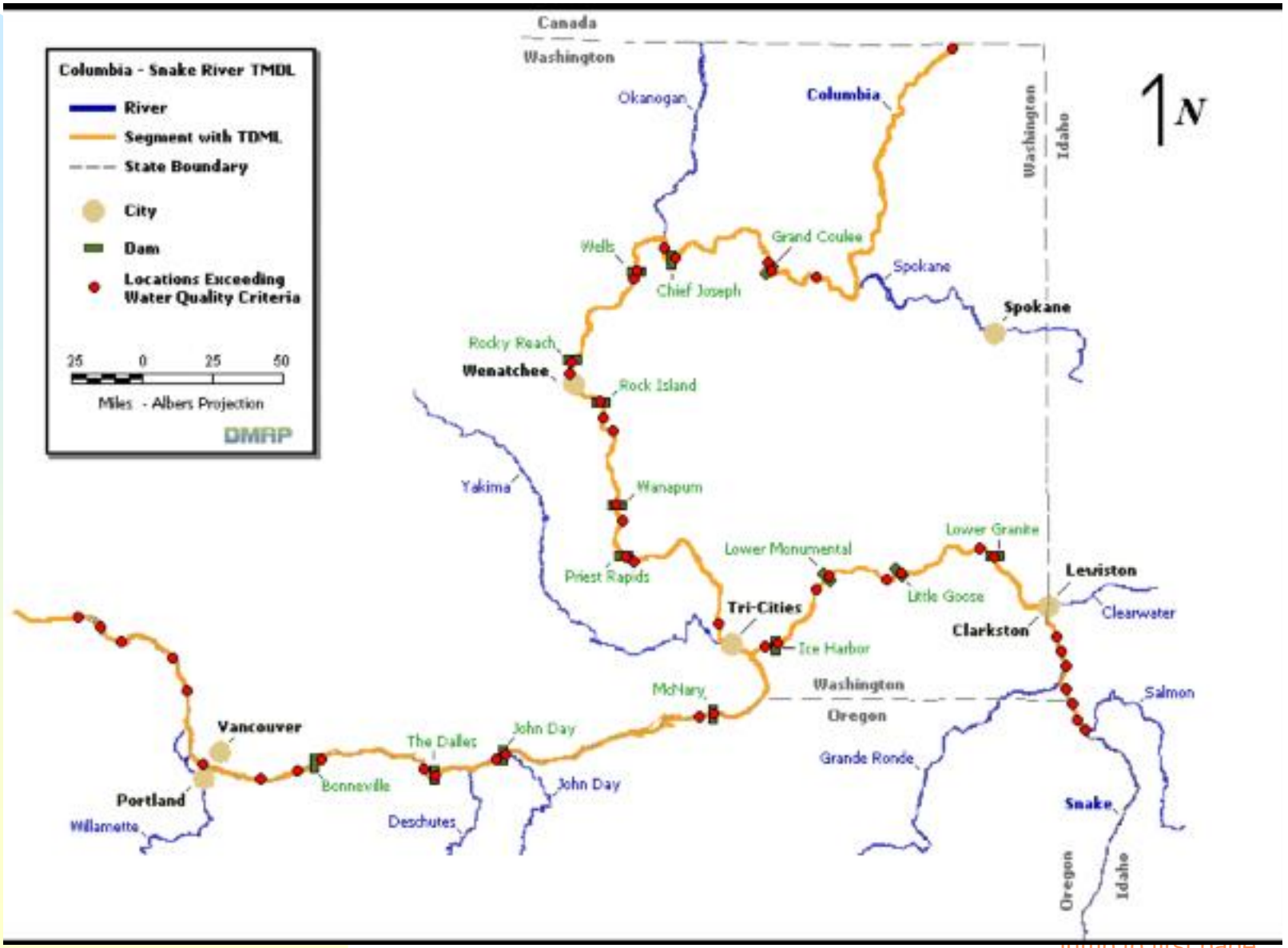
Geographic Scope



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Water Quality Standards

State and tribal standards call for a return to natural river temperatures, plus small incremental increases due to human activity.

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Why Do We Need A Model?

- **We need to estimate temperatures under un-impounded conditions for which measurement data is scarce**

- **We need to estimate influence of different sources**

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What is our Model?

- **Process Model - Physics, Math**
- **Measurement Model - Thermometers, Thermistors**

- **When available, we use both estimates to arrive at a “best” estimate of the river temperature**

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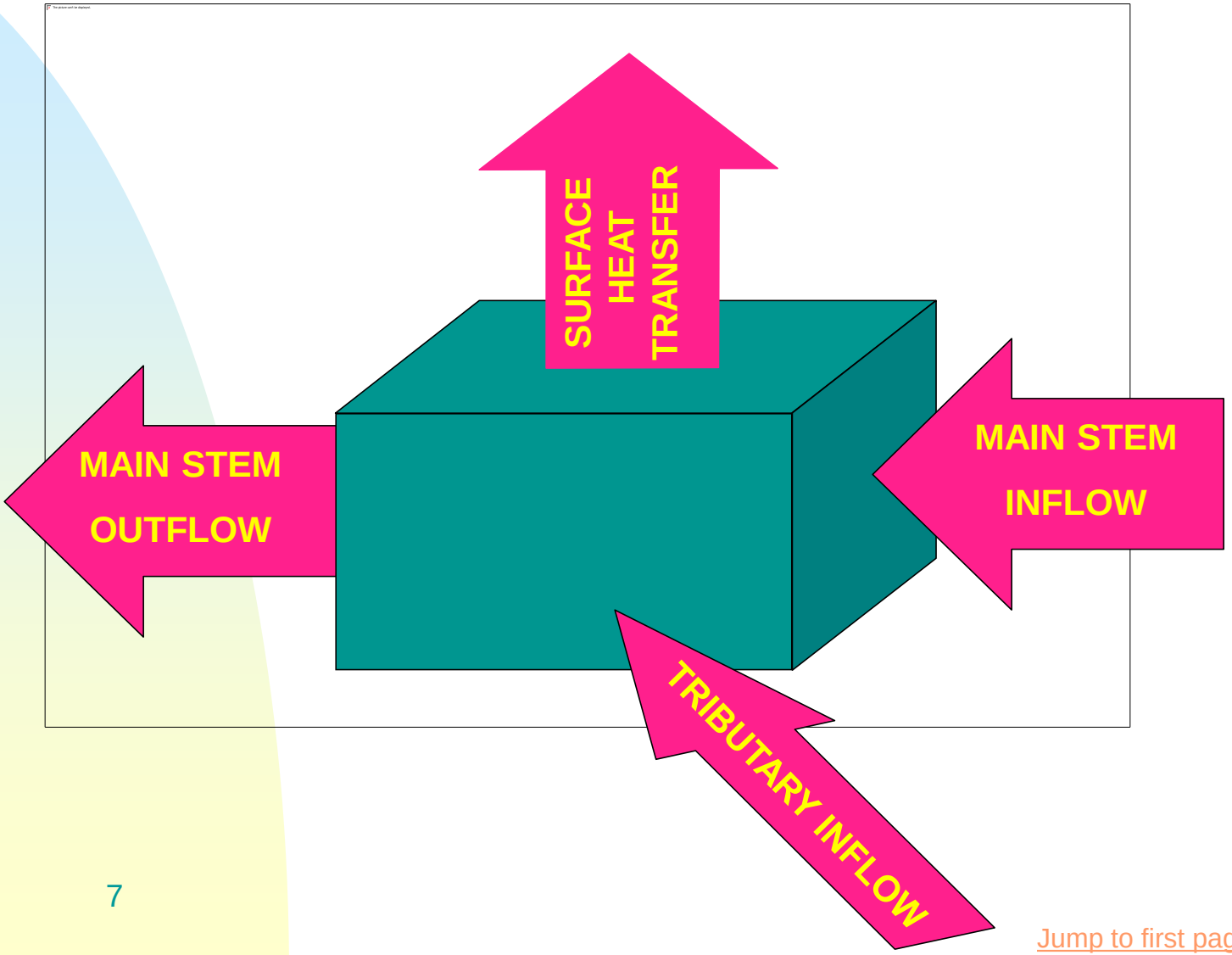
ONE-DIMENSIONAL ENERGY BUDGET MODEL



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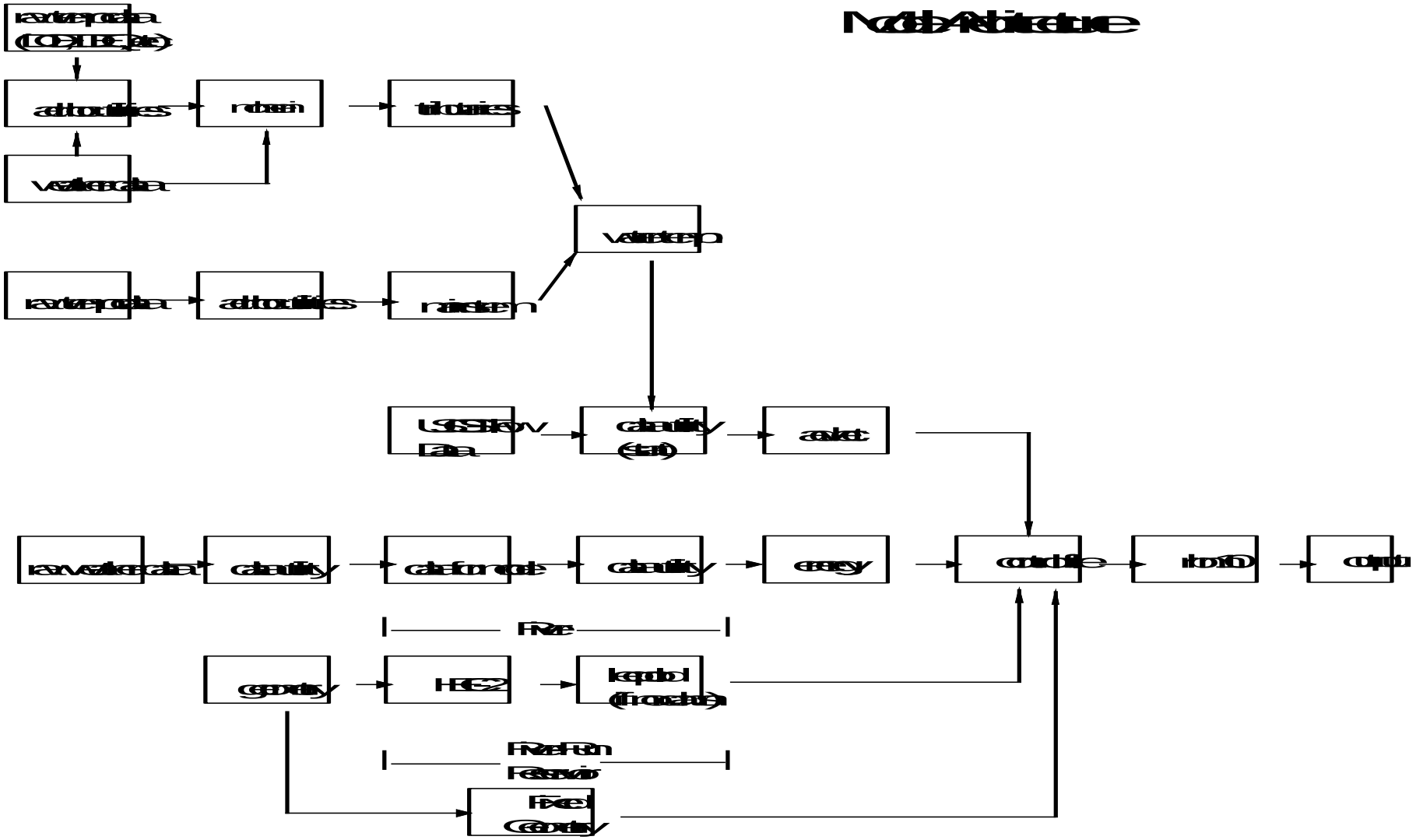
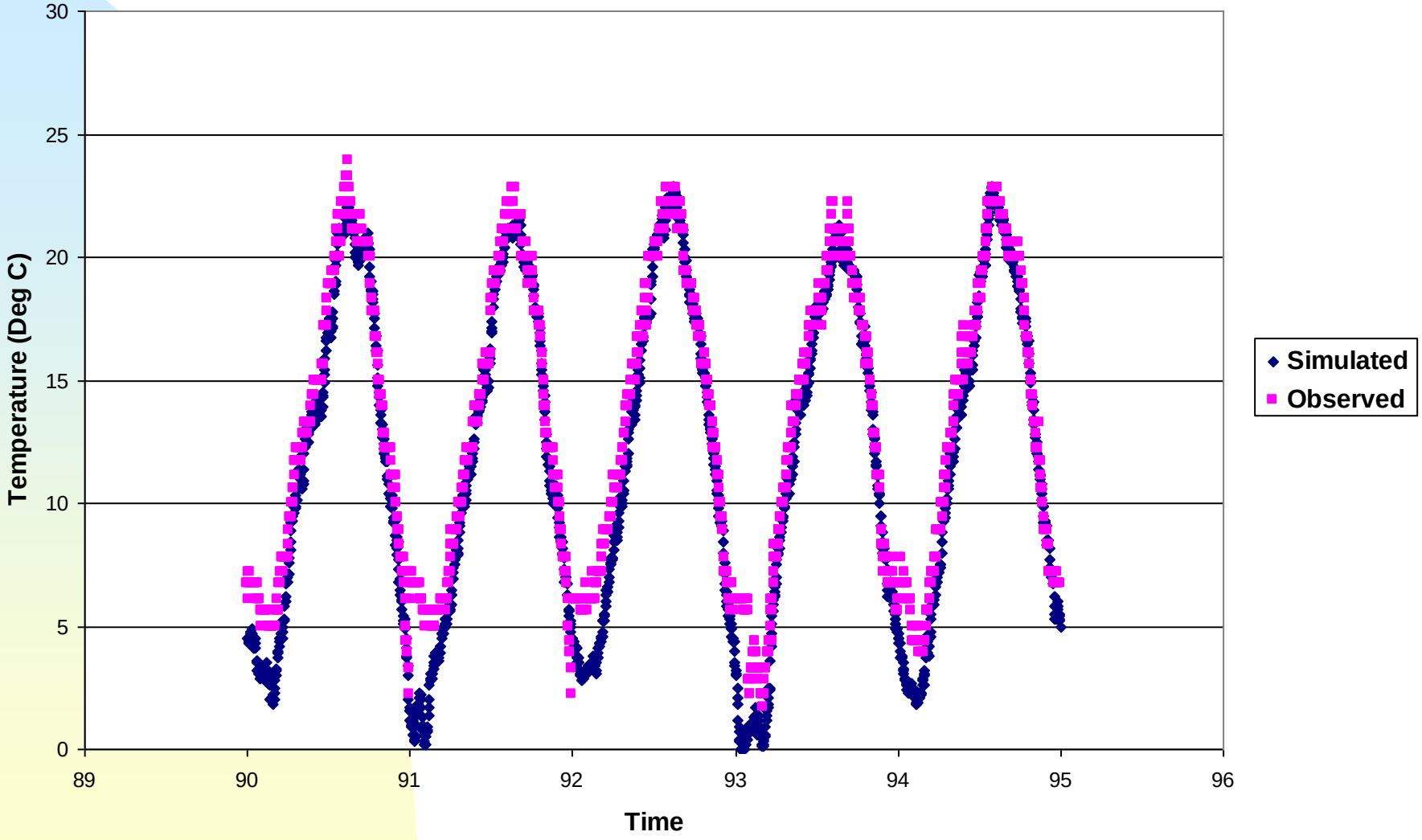


Simulated and Observed Temperature at Bonneville 1990 - 1994



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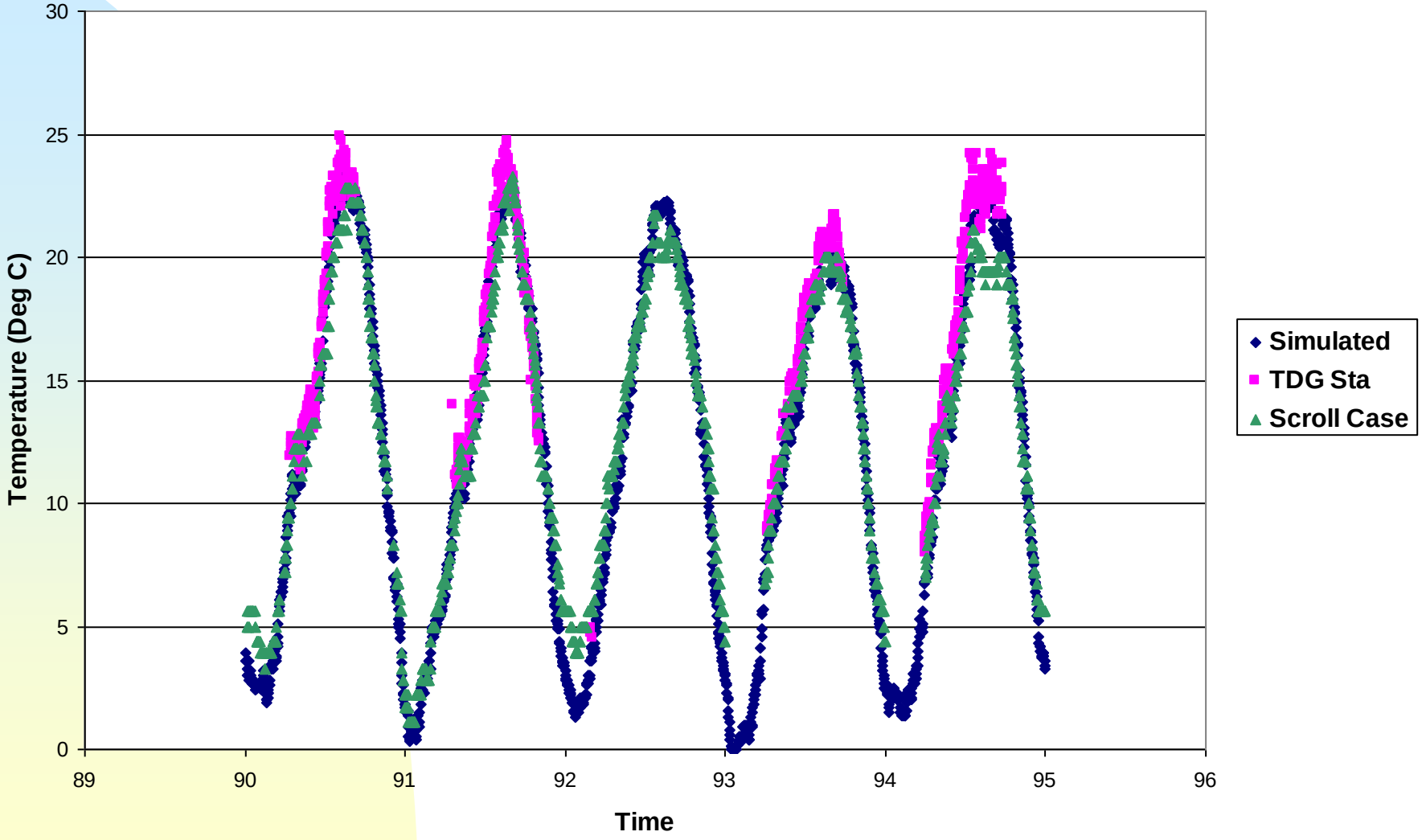
Simulated and Observed Temperatures at Ice Harbor 1990 - 1994



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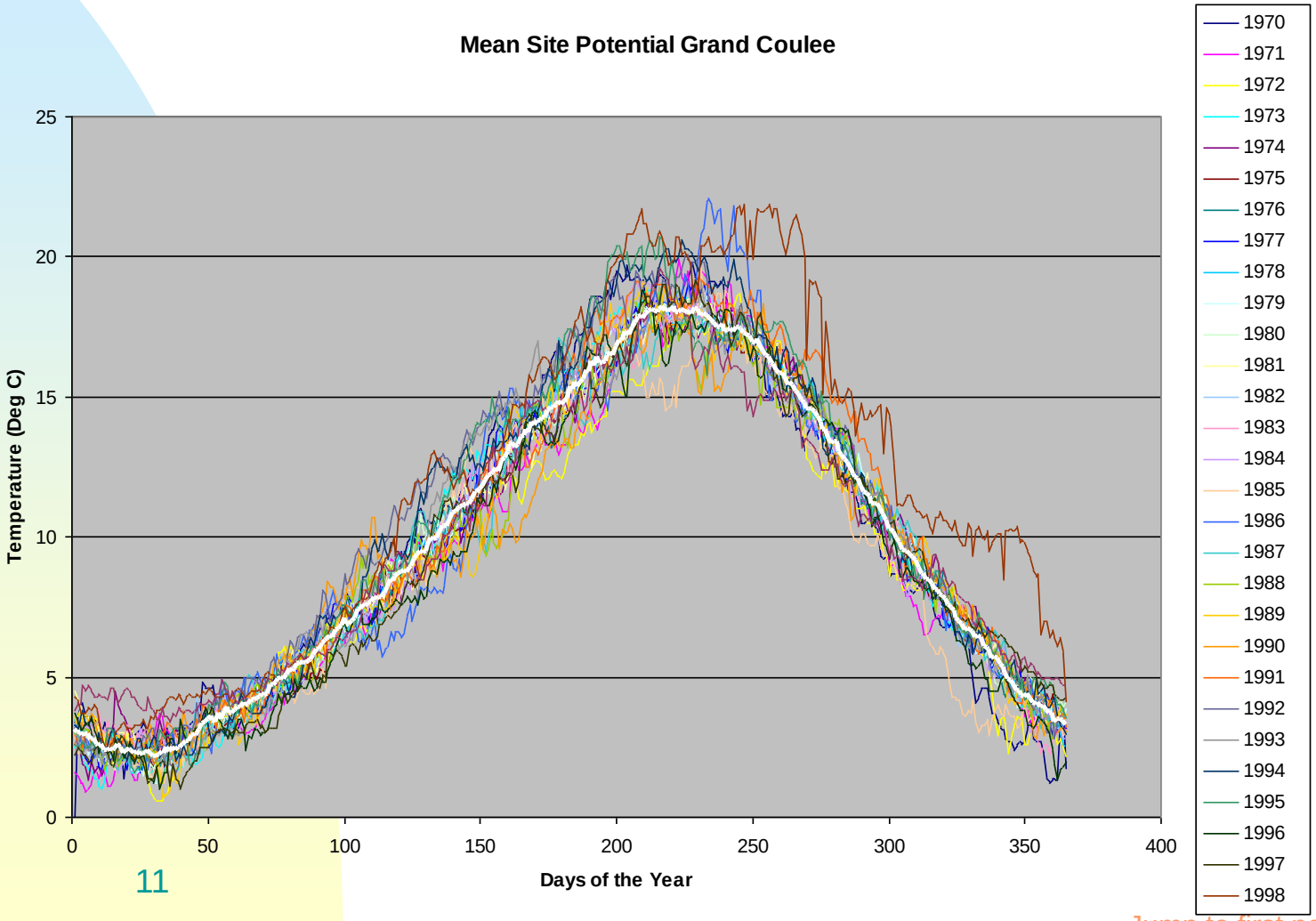
To account for this variability we utilize the mean daily site potential temperatures based on 30 years of simulations using actual weather and flow data.



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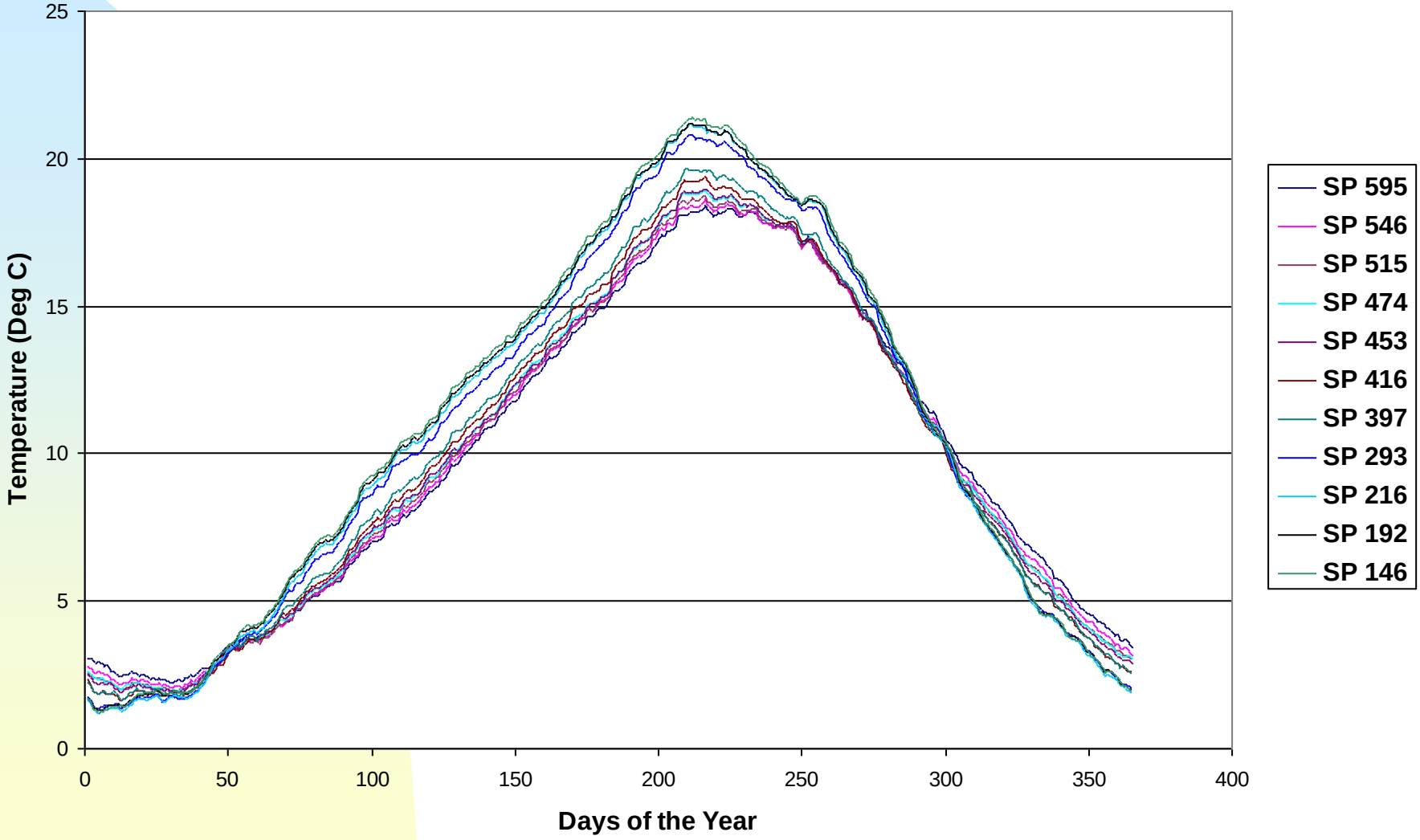
Columbia River Site Potential Temperatures at Each Target Site



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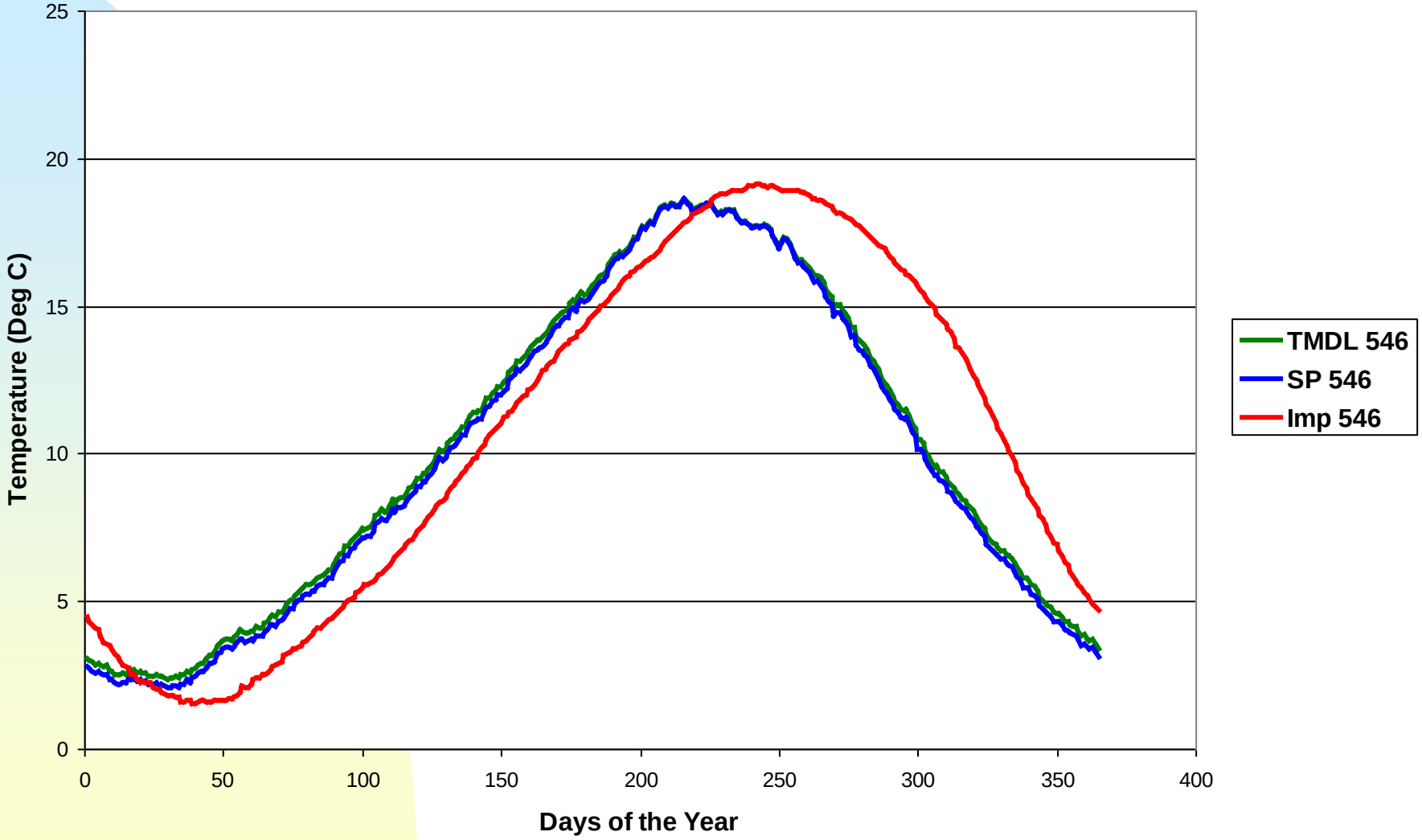
Chief Joseph Target, Site Potential and Impounded Temperatures



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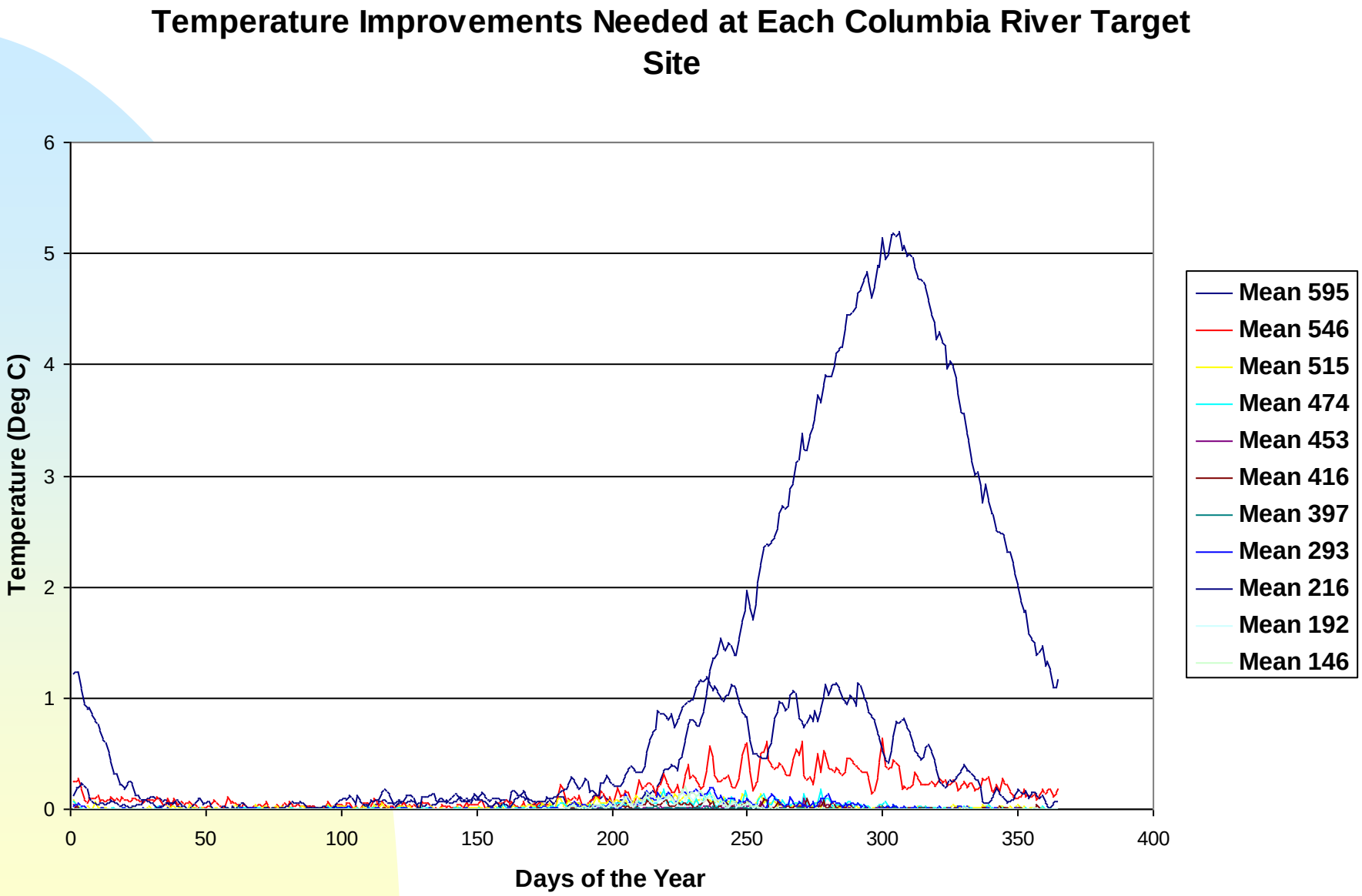
Approach 1



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